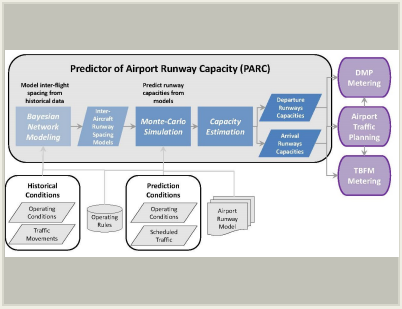
Small Business Innovation Research/Small Business Tech Transfer

Predictor of Airport Runway Capacity (PARC), Phase I

Completed Technology Project (2017 - 2017)

Project Introduction

Estimates of arrival and departure capacities of individual airport runways are used to predict occurrences of demand-capacity imbalance, and to meter arrivals and departures to balance runway demand with capacity. Inaccurate estimates incorrectly identify demand-capacity, imbalance time periods and metering solutions; resulting in underutilized runways or excessive traffic congestion. Accurate predictions enable maximizing airport and flight efficiency. The Predictor of Airport Runway Capacity (PARC) forecasts the future capacities of individual airport runways under specified operating conditions and a time horizon. PARC uses historical operations data to create and update statistical Bayesian network (BN) models of inter-aircraft spacing, accounting for influencing factors. The BN models are used in Monte-Carlo simulations of airport runway traffic to predict their arrival and departure capacities for the specified operating conditions and scheduled traffic. Traffic managers use PARC's capacity estimates to implement metering programs to efficiently balance runway demand with capacity. For example, forecast weather proximate to Charlotte-Douglas International Airport (CLT) will change the prevailing wind direction, ceiling, and Runway Visual Range (RVR), requiring changing the airport runway configuration from South Flow to North Flow and the operational flight rules from visual to marginal. Traffic planners want to know if these changes will cause excessive traffic congestion warranting implementation of a departure metering program. PARC determines that the number of scheduled departures will exceed capacity on runway 36C under the forecasted runway configuration, visibility, and traffic conditions. The traffic planners implement metering of runway 36C departures using PARC's runway capacity estimate. Because the estimated runway capacity is accurate, metering neither starves the runways of flights nor creates excessive runway departure queues.



Predictor of Airport Runway Capacity (PARC), Phase I Briefing Chart Image

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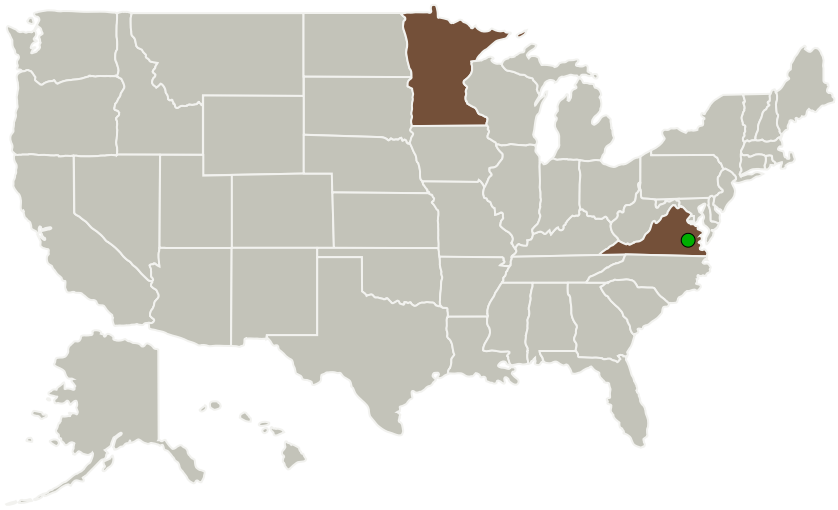
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Architecture Technology Corporation	Lead Organization	Industry	Eden Prairie, Minnesota
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Minnesota	Virginia

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Architecture Technology Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

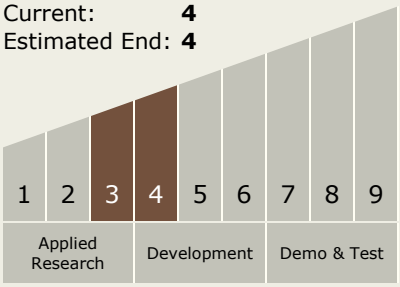
Carlos Torrez

Principal Investigator:

Sebastian D Timar

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



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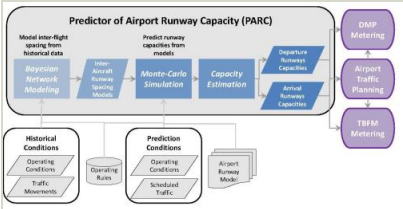
Images



Briefing Chart Image
Predictor of Airport Runway Capacity (PARC), Phase I Briefing Chart Image *(https://techport.nasa.gov/image/131553)*

Technology Areas

Primary:

- TX16 Air Traffic Management and Range Tracking Systems
  - TX16.3 Traffic Management Concepts